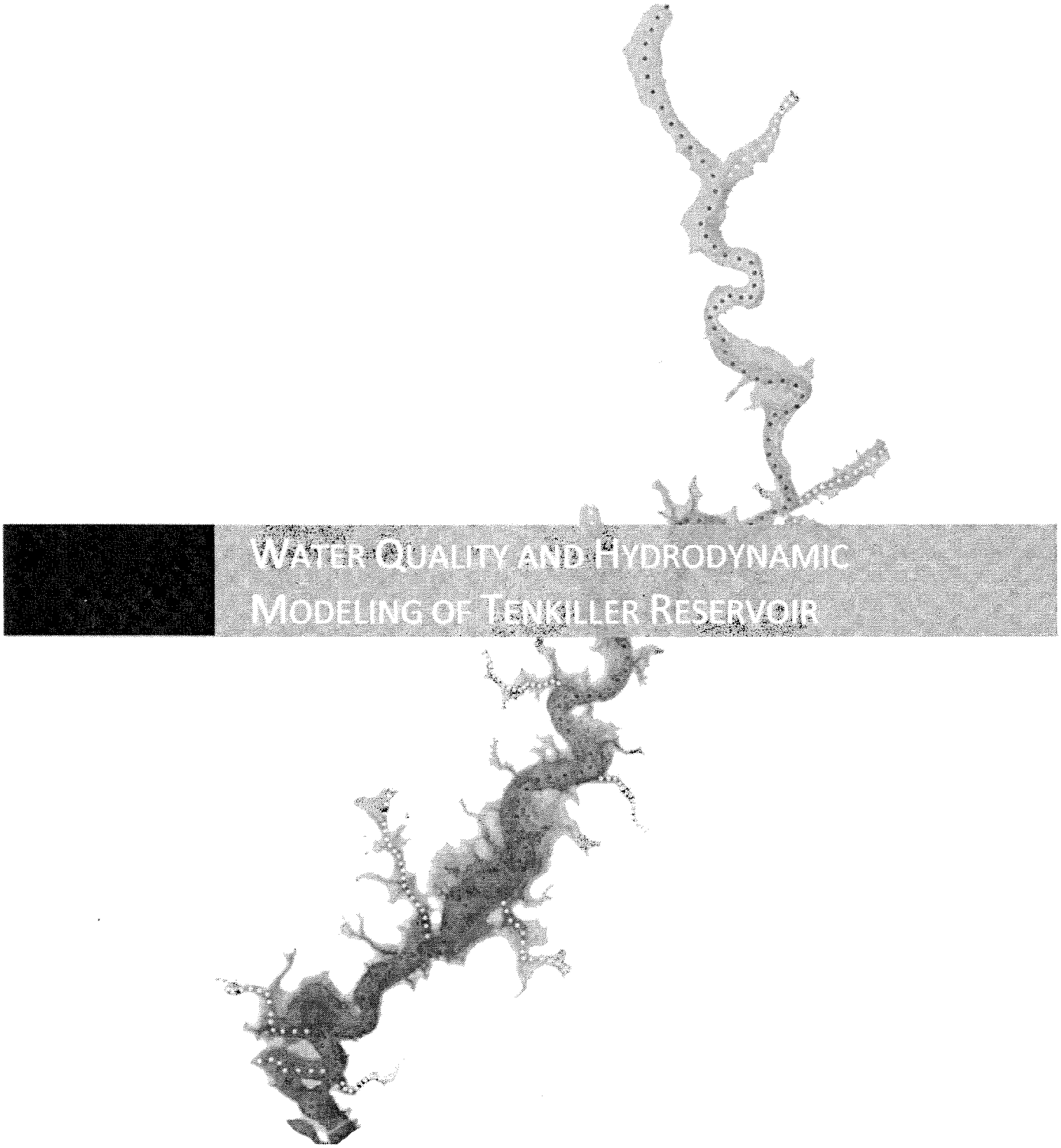

Water Quality and Hydrodynamic Modeling of Tenkiller Reservoir

Prepared for the State of Oklahoma | S. Wells, V. Wells, and C. Berger

Water Quality and Hydrodynamic Modeling of Tenkiller Reservoir

Expert Report of S. A. Wells

V. I. Wells

and

C. J. Berger

for

State of Oklahoma

in

Case No. 05-CU-329-GKF-SAJ

State of Oklahoma v. Tyson Foods, et al.

(In the United States District Court for the Northern District of Oklahoma)

Digitally signed by Scott Wells
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May 2008

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Introduction

Tenkiller Reservoir, sometimes called Tenkiller Ferry Lake, is a Corps of Engineers facility operated by the Tulsa District located in Oklahoma (see Figure 1). Tenkiller Reservoir is on the Illinois River, which originates in Arkansas, and eventually drains into the Arkansas River. The State of Oklahoma has designated the Illinois River as a scenic river.

Because of the issues associated with impacts of poultry waste applied to agriculture lands in the basin, a hydrodynamic and water quality model of Tenkiller Reservoir was constructed to evaluate how the reservoir would respond to future changes in nutrient loading from the watershed and has responded to past changes in nutrient loading from the watershed.

The objective of this project is to produce a hydrodynamic and water quality model of Tenkiller Reservoir that is calibrated to field data and that can predict the impacts of various nutrient loading scenarios. In order to meet that objective, the following steps were performed and described in this report:

1. Compile data for the modeling effort
2. Set-up a model for Tenkiller Reservoir for the following parameters: water surface elevation, velocities, temperature, dissolved oxygen, labile/refractory dissolved organic matter, labile/refractory particulate organic matter, algae, PO_4-P, NH_3-N, NO_3-N + NO_2-N, suspended solids.
3. Calibrate the model to field data
4. Evaluate management scenarios

This report contains the following sections:

1. Previous model studies
2. Model selection
3. Model set-up
4. Model calibration
5. Model alternatives
6. Summary and Conclusions